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Global Financial Risk, Domestic Financial Access, and Unemployment Dynamics*

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Abstract

We empirically show that after an increase in global financial risk, the response of unemployment is markedly more subdued in emerging economies (EMEs) relative to small open advanced economies (SOAEs), while the differential response of GDP and investment across the two country groups is noticeably smaller, if at all, in EMEs. A model with banking frictions, frictional unemployment, and household and firm heterogeneity in financial inclusion can help rationalize these facts. Limited financial inclusion among households is central to explaining the differential response of unemployment in EMEs amid global financial risk shocks.

JEL Classification: E24, E32, E44, F41

Keywords: Emerging economies, business cycles, unemployment, labor search frictions, financial frictions, financial inclusion.

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1 Introduction

The Global Financial Crisis of 2008-2009 represents a clear example of how U.S. financial disruptions can have dramatic effects on employment and economic activity, and also propagate to emerging economies (EMEs) and advanced economies. Given the prominent role of the U.S. in global financial markets, such disruptions are effectively exogenous increases in global financial risk from the vantage point of EMEs and *small open* advanced economies (SOAEs). Recent studies have stressed the international transmission of U.S. financial risk shocks to these country groups via credit markets and the banking system. However, much less is known about the factors that shape the degree of *domestic* propagation of these foreign shocks and, importantly, their consequences for *domestic* labor markets in EMEs and SOAEs. As we document in this paper, such issues are non-trivial since these country groups exhibit striking differences in the rates of firm *and* household financial inclusion and participation in the domestic banking system, with SOAEs having considerably higher rates relative to EMEs.

Motivated by these facts, this paper provides new VAR-based evidence suggesting that, in response to an increase in global financial risk—defined as a rise in U.S. firm credit spreads, which embody U.S. (or global) financial risk—the response of unemployment is markedly and unambiguously more subdued in emerging economies (EMEs) relative to small open advanced economies (SOAEs). In contrast, the *differential response* of GDP and investment *across the two country groups* is noticeably smaller, with aggregate economic activity exhibiting, on average, marginally earlier recoveries, if at all, in EMEs. To rationalize these new empirical facts we build a small open economy (SOE) model with labor search frictions, a frictional banking structure, and heterogeneity in firm and household participation in the banking system at its core.

Our framework features two household and firm categories. First, financially-included households that participate in the banking system by holding bank deposits and financially-included firms that rely on bank credit to finance capital purchases. Second, financially-excluded households that do not hold deposits and therefore do not participate in the banking system and household firms that do not (or cannot) borrow from banks and therefore do not participate in the banking system.[1] Banks use deposits from financially-included households, foreign funds, and their own net worth to lend to financially-included firms. Following the literature on banking frictions, banks face frictions in raising external funds (deposits and foreign resources) as a result of agency problems. A temporary adverse global financial shock disrupts banks' ability to raise these funds, leading to a contraction in the supply of available loans for capital purchases, and in turn to reductions in aggregate employment, investment, and output.

To shed light on the differential response of EMEs and SOAEs to global financial risk in the data, and guided by cross-country evidence on domestic financial participation, we consider two versions of our model that differ primarily in the degree of firm and household financial participation in order to arrive at "representative" characterizations of EMEs and SOAEs.

Our quantitative analysis shows that the contribution of firms with bank credit to total output (a broad measure of firm financial inclusion in the model), of which SOAEs tend to have a larger share compared to EMEs,

[1] Given that our interest is in the employment and aggregate consequences of limited financial participation by households *and* firms and *not* in explaining why certain firms or individuals do not or cannot participate in the banking system, we abstract from modeling the underlying frictions (informational, contractual, etc.) at the root of the limited depth of firms' and households' financial inclusion in EMEs relative to SOAEs and simply take this depth differential as given.

shapes the extent of the contraction and recovery in investment and output after an increase in global financial risk. This result is intuitive: the larger is the contribution of firms that rely on bank credit to total output, the larger the share of the economy that is vulnerable to changes in global financial risk. *Surprisingly, by itself, the contribution of firms using bank credit to total output plays plays virtually no role in explaining the markedly more subdued and less persistent empirical response of unemployment in EMEs after an increase in global financial risk.* Instead, it is the share of financially-excluded individuals in the economy—*and the implied allocation of employment across the two firm categories*—that is central to explaining the empirical difference in the response of unemployment to an increase in global financial risk in EMEs relative to SOAEs. We stress that the allocation of employment across firm categories is endogenous in our model and a direct reflection of the level of financial inclusion among households. Intuitively, the larger the share of individuals in households *without* access to bank deposits, the smaller the amount of available resources for firms with bank credit. As such, the larger the *endogenously-determined* share of employment in firms *without* access to bank credit, the larger the share of employment that is (partially) shielded from an increase in global financial risk, and therefore the smaller the increase in unemployment after an adverse financial shock. Of note, empirical evidence on the share of employment in firms that tend to lack access to bank credit in EMEs and SOAEs broadly supports the allocation of employment that is endogenously generated by our model-based prototypical EMEs and SOAEs. Importantly, by using a richer version of our baseline model where households can search for employment across firm categories, we stress and explicitly show that the differential response of unemployment generated by the model, which is consistent with our new VAR evidence, does not hinge on segmented labor markets.

Our findings suggest that, *conditional on shocks to global financial risk and when compared to SOAEs*, EMEs are on average less responsive to such shocks because of their firms' and households' lower levels of domestic participation in the banking system. Of course, we stress that our findings do *not* imply that EMEs are less volatile than SOAEs; other shocks and economic characteristics that we abstract from (trend, terms-of-trade, uncertainty, and *domestic* financial shocks and distortions; international trade disturbances, etc.) can be responsible for the well-known higher variability of aggregate economic activity in EMEs. At the same time, our results do not imply that interest rate shocks are any less relevant for short-run economic activity or unemployment in EMEs. Indeed, an important literature supports the relevance of these (and other) shocks for EME business cycles. The subtle but important difference between our work and existing studies stems from the fact that our work explicitly compares the response of EMEs to SOAEs, whereas most of the EME literature has generally focused on the effects of these and other shocks *only in EMEs*. We also stress that our goal is *not* to explain the underlying reason behind differences in financial inclusion among firms and households. Instead, we focus on the *consequences* of these differences for the economy's response to changes in global financial risk.

The importance of interest rates, financial frictions, and financial shocks for aggregate fluctuations in EMEs is well known (Neumeyer and Perri, 2005, Uribe and Yue, 2006; Mendoza, 2010, Akinci, 2013; Fernández and Gulan, 2015; Fink and Schüler, 2015). Our work is closest to the growing literature on financial frictions (Jermann and Quadrini, 2012; Gilchrist and Zakrajšek, 2012), and specifically in the banking sector (see Gertler and Kiyotaki, 2010; Gertler and Karadi, 2011; Gertler, Kiyotaki, and Queralto, 2012; Dedola, Karadi, and Lombardo, 2013, for advnaced economies; and Akinci and Queralto, 2014; Aoki, Benigno, and Kiyotaki, 2016; Cuadra and Nuguer, 2015; Nuguer, 2015; Große Steffen, 2015; among others, for EMEs).[2] The banking frictions in our framework are similar to those in Aoki, Benigno, and Kiyotaki (2016), who consider EMEs where banks use both domestic deposits and foreign funds to finance lending activities. Of note, none of these papers consider unemployment dynamics, or how EMEs and SOAEs may be affected differentially by financial disruptions.[3] Finally, recent work has studied global business cycles and the propagation mechanisms that might explain them (see, for example, Kose et al., 2012). Our work is related to the latter literature only insofar as we consider global financial risk shocks as a source of fluctuations in small open (advanced and emerging) economies. However, our interest is not in explaining global business cycles but in exploring how small open economies' degree of domestic financial access shapes these economies labor market and aggregate response to changes in global financial conditions.

Our main contributions to the literature are: documenting a new and robust empirical fact on the differential response of economic activity *and more importantly unemployment* to global financial risk shocks *in EMEs vis-à-vis SOAEs and not in EMEs exclusively*; exploring the effects of global financial

[2]See Monacelli, Quadrini, and Trigari (2012); Buera, Fattal Jaef, and Shin (2015); Epstein, Finkelstein Shapiro, and González Gómez (2017) for work on the interaction between financial *shocks* and employment dynamics. The studies on banking frictions above consider the propagation of financial shocks within or across economies through the banking system. A related literature has explored the propagation of shocks via trade flows (see, for example, Alessandria, Kaboski, and Midrigan, 2013). Given our specific focus on financial conditions, we abstract from considering trade flows in our work. However, we control or such flows in our empirical analysis.

[3]Fernández and Meza (2015) characterize the role of informal employment for EME business cycles. Papers that address unemployment dynamics with a focus on EMEs include Boz, Durdu, and Li (2015), Epstein and Finkelstein Shapiro (2017), and Finkelstein Shapiro and González Gómez (2017), among others. None of these studies address the heterogeneity in financial inclusion on the households side, which we show to be critical.

shocks in a model that merges frictions in the banking system with firm and household heterogeneity and equilibrium unemployment, where the latter is of key interest in light of the Global Financial Crisis of 2008-2009; and stressing the importance of differences in not only firm but also household domestic financial participation between EMEs and SOAEs for understanding the labor market and aggregate responses to financial shocks.[4]

The rest of the paper is structured as follows. Section 2 presents the main facts that motivate our modeling approach and describes the new VAR-based evidence on global financial risk shocks. Section 3 presents the model. Section 4 describes our quantitative approach and analysis. Section 5 concludes.

2 Empirical Evidence

We compare EMEs to SOAEs and abstract from larger advanced economies for two main reasons. First, while the latter economies are clearly affected by U.S. financial risk, they are large enough to also influence U.S. financial risk, implying that the identification of global financial risk shocks is less straightforward. Second, SOAEs are naturally more comparable to EMEs relative to their larger counterparts by being small and open as well.

2.1 Domestic Financial Inclusion and Participation

To arrive at our representative EMEs and SOAEs in the model, Table 1 documents the wide empirical disparities between EMEs and SOAEs in participa-

[4]In recent empirical work, Gilchrist and Mojon (2017) document the response of economic activity, including unemployment, to changes in financial risk in the Euro area. While our focus on financial risk is similar to theirs, we center on the differences between EMEs and SOAEs as opposed to a single country group, and focus on differences in domestic financial inclusion.

tion in, and access to, financial institutions by households and firms. On the household side, while the average share of the population with an account at financial institutions—an indicator of households' participation in (and access to) the domestic banking system—is virtually 100 percent in SOAEs, it is only 45 percent in EMEs.[5].

Turning to firms, while bank loans represent the primary source of external financing for the majority of *registered* (or formal) firms in both country groups, only 30 percent of firms in EMEs have access to and use such financing. In contrast, at least 70 percent of firms in SOAEs use bank loans (Table 2; Table A1; IFC Enterprise Finance Gap Database; IFC, 2010a,b). Unsurprisingly, then, a larger fraction of firms in EMEs cite credit access as a major constraint (Table 1; Beck and Demirgüç-Kunt, 2006; Beck, Demirgüç-Kunt, and Martínez Pería, 2007; Beck, Demirgüç-Kunt, and Maksimovic, 2008; Ayyagari, Demirgüç-Kunt, Maksimovic, 2012).[6] All told, the majority of firms in EMEs does not have access to bank credit (or any other type of formal credit),

[5]Similarly, the share of individuals who receive their wages directly into an account at financial institutions—which offers an alternative picture of financial inclusion that also provides information on firms' participation (since firms must participate in the banking system in order to deposit wages into their workers' accounts)—is almost 100 percent in SOAEs versus 51 percent in EMEs. See Table A1 in the Appendix for disaggregated data by country. Of note, compared to SOAEs, EMEs tend to have lower shares of salaried employment and higher shares of self-employment (see OECD, 2009). As such, the contrasting shares of workers that receive their wages in an account at financial institutions makes the SOAEs' higher degree of household financial inclusion all the more noteworthy

[6]According to IFC (2010a,b), close to 50 percent of registered small and medium enterprises (SMEs, or firms with less than 250 workers) in EMEs either need loans but do not have access to credit, or face significant financing constraints. Moreover, *registered* SMEs represent only 30 percent of all firms. The remaining 70 percent of SMEs are unregistered—or informal—and have little to no access to bank financing despite these firms stating a need for credit. *Importantly, SMEs account for the majority of firms in these economies as well as a significant share of employment.* In contrast, Eurostat survey data shows that: the majority of firms in SOAEs participate in the banking system; the bulk of loan finance obtained by SOAE firms comes from banks; loan finance represents the most sought-after source of finance; and more than 90 percent of firms seeking bank finance are successful in receiving loans (OECD, 2012, 2016; European Central Bank, 2015).

whereas the opposite is the case in SOAEs. Importantly, we note that only a minuscule share of firms in EMEs—those publicly-traded and participating in stock markets—can tap (local and international) equity markets in order to substitute or complement bank credit, with most firms in EMEs relying on internal resources or informal external financing (IFC, 2010a,b).

Table 1: Households Financial Inclusion in Advanced versus Emerging Economies

Country Group	Account at Financial Institutions (% of Population Age 15+)	Received Wages into Account in Financial Institution (% Wage Recipients, Age 15+)	Ease of Access to Loans Index (7 = very easy, 1= impossible)
AEs	97.7	95.9	4.85
EMEs	45.0	50.6	3.42

Source: World Bank Global Financial Inclusion Database 2015, World Economic Forum (WEF) Financial Development Report 2008. Notes: The SOAE sample includes Australia, Austria, Belgium, Canada, Denmark, Finland, Israel, New Zealand, Netherlands, Norway, and Sweden. The EME sample includes Brazil, Colombia, Ecuador, Malaysia, Mexico, Peru, Philippines, South Africa, Thailand, and Turkey. We use the 2011 (2014) survey from the Global Findex Database for the share of individuals with an account at financial institutions (the share of recipients of wages receiving their salary directly into an account at a financial institution; data from 2011 on this variable is generally not available for most economies). Norway is the only country for which we use data from 2014 for both measures due to data availability. The measure for "Ease of Access to Loans" is based on the following question from the WEF Executive Opinion Survey 2006, 2007: "How easy is it to obtain a bank loan in your country with only a good business plan and no collateral?".

Table 2: Firm Access to Financing in Advanced European Economies and Emerging Economies

Country Group	Firm Category	Share of Total Firms (%)	Share of Firms with Bank Credit Access (% Firms)	Share of Firms with Bank Loans (% Firms)	Bank as a Source of Financing (% Firms)
EMEs	Formal	32.22	69.78	49.33	85.5
	Informal	67.78	13.11	12.44	–
AEs	Formal	69.30	–	68	90.2
	Informal	30.70	–	–	–

Sources: IFC Enterprise Finance Gap Database 2010 (for EMEs), Eurostat an Survey of Access to Finance of Enterprises (SAFE, 2011) (for advanced European economies, AEs), and World Bank World Development Indicators (credit spreads). Notes: The list of AEs from SAFE includes: Austria, Belgium, Finland, and Netherlands. The list of EMEs includes Brazil, Colombia, Ecuador, Malaysia, Mexico, Peru, Philippines, South Africa, and Turkey (there is no data available for Thailand). The data on the fraction of formal and informal firms for AEs is based on IFC data for Australia, Austria, Belgium, Canada, Denmark, Finland, Netherlands, New Zealand, Norway, and Sweden. The remaining evidence for AEs is from SAFE 2011 since there is no available comparable data on access to financing for advanced economies in the IFC Enterprise Finance Gap Database. Thus, this evidence is only meant to be illustrative of the differences in firms' access to finance between EMEs and AEs. Formal firms are comprised of registered micro (1-4 employees), very small (5-9 employees), small (10-49 employees), and medium (50-250 employees) enterprises. Informal firms are unregistered with their municipality or the country's tax authorities, and includes owner-only firms regardless of registration status. See https://www.smefinanceforum.org/data-sites/ifc-enterprise-finance-gap for more details. The facts for advanced economies are based on information reported by all firms included in the survey (gazelles, high-growth enterprises, and other enterprises). The share of firms with a loan for advanced economies includes firms with bank loans and/or bank overdrafts. See Table A1 for a decomposition of Table 2 by country for EMEs.

2.2 Global Financial Risk and Unemployment

Data and Empirical Specification We use data from 2003Q1 to 2015Q4 for a balanced panel of SOAEs and data from 2005Q1 to 2015Q4 for a balanced panel of EMEs to characterize the response of aggregate economic activity (real GDP and investment) and unemployment to global financial risk shocks in the two country groups. The sample starting dates are determined by (1) the availability of uninterrupted time series for *quarterly* unemployment rates across countries (more on this below) and (2) the starting date of our measure of global financial risk.[7] The Appendix presents all details pertaining to the data sources and specific variable definitions that are not essential for presenting our stylized fact.

The countries we consider are standard in the literature on EMEs and

[7]Some EMEs experienced changes in their labor force surveys in the early 2000s, making the series prior to the change not comparable to the ones based on the new surveys. Mexico and Brazil are two well-known examples. We also note that both SOAEs *and* EMEs not only follow explicit ILO guidelines but also rely on labor force surveys that explicitly consider both formal *and* informal employment to measure official unemployment rates. As such, while informal employment may play a relevant role in unemployment rates in EMEs (see, for example, Bosch and Maloney, 2008), it is explicitly incorporated into measurements of unemployment in both country groups.

SOAEs (Neumeyer and Perri, 2005; Uribe and Yue, 2006; Boz, Durdu, and Li, 2015), and chosen based on data availability on unemployment at a quarterly frequency. As noted earlier, we abstract from advanced economies that may be large enough to influence our measure of global financial risk and focus on SOAEs that may be more comparable to (small open) EMEs. All told, the SOAE country sample includes: Australia, Austria, Belgium, Canada, Denmark, Finland, Israel, Netherlands, New Zealand, Norway, and Sweden. Our baseline EME country sample includes: Brazil, Colombia, Mexico, Peru, Philippines, and Thailand.[8] We note that excluding Netherlands and Thailand from the SOAE and EME samples, respectively, allows us to extend the SOAE time coverage back to 1999Q1 and the EME time coverage to 2003Q1. The Appendix presents results excluding these two countries. Most importantly, our main finding regarding unemployment remains unchanged.

Our approach builds on the well-known empirical work of Uribe and Yue (2006). Our analysis is also closest to Akinci (2013), who extends Uribe and Yue (2006) to analyze the role of global financial risk. We discuss key differences relative to their work further below.

Our estimation consists of two separate panel structural vector autoregressions (SVAR), one for each country group (SOAE or EME):

$$A\mathbf{y}_{i,t} = \alpha_i + \sum_{k=1}^{p} B_k \mathbf{y}_{i,t-k} + \varepsilon_{i,t},$$

where i denotes a given country, α_i denotes country fixed-effects, and the

[8] Turkey and South Africa, which are commonly included in the EME group in the literature, represent clear outliers with respect to the level and cyclical volatility of unemployment. We present results with these two countries in the EME sample in the Appendix (see Figure A4). Also, while Israel is often included as an EME, it has levels of financial inclusion that are similar to those of standard SOAEs.

vector $\mathbf{y}_{i,t} = [y_{i,t}, inv_{i,t}, u_{i,t,}, tby_{i,t}, S_{g,t}, S_{c,t}]$, where $y_i, inv_i, u_i, tby_i, S_g$, and S_c denote real GDP, real investment, *the unemployment rate*, the trade-balance-to-GDP ratio for country i, our measure of global financial risk, and a measure of country-group (SOAE or EME) financial risk, respectively. The inclusion of the trade balance allows us to control for spillover effects across countries via trade flows. All variables are expressed in log deviations from a log-linear trend, except for the trade balance-GDP ratio which is expressed in level deviations from trend (see Uribe and Yue, 2006).[9] We use Bank of America Merrill Lynch's U.S. high yield option-adjusted spreads as our measure of global financial risk S_g, the Euro high yield index option-adjusted spread as a measure that captures country-group financial risk or credit spreads for SOAEs (most of which are in Europe and absent other country group measures that include non-European small open advanced economies), and the high yield emerging markets corporate plus sub-index option-adjusted spread as a measure that captures country-group financial risk or credit spreads for EMEs (non-crucial details regarding these measures are presented in the Appendix). The financial risk series are obtained from FRED; country-level variables are obtained from Haver Analytics. Our main results are based on the parsimonious specification above (following related literature), but we show that our results—especially with regards to unemployment—hold broadly under several alternative and richer specifications in the Appendix.

Our choice of country-group credit spread measures for EMEs and SOAEs is guided by several considerations. First, including country-group spread measures that are comparable between the two country groups allows us to

[9]For the unemployment rate and the relevant spread measures, whose original series are in rates, we use $u_{i,t} = \log(1 + u^o_{i,t})$, $S_{g,t} = \log(1 + S^o_{g,t})$, and $S_{c,t} = \log(1 + S^o_{c,t})$, where variables with a superscript o stand for the original series expressed in rates. This has no impact on our results.

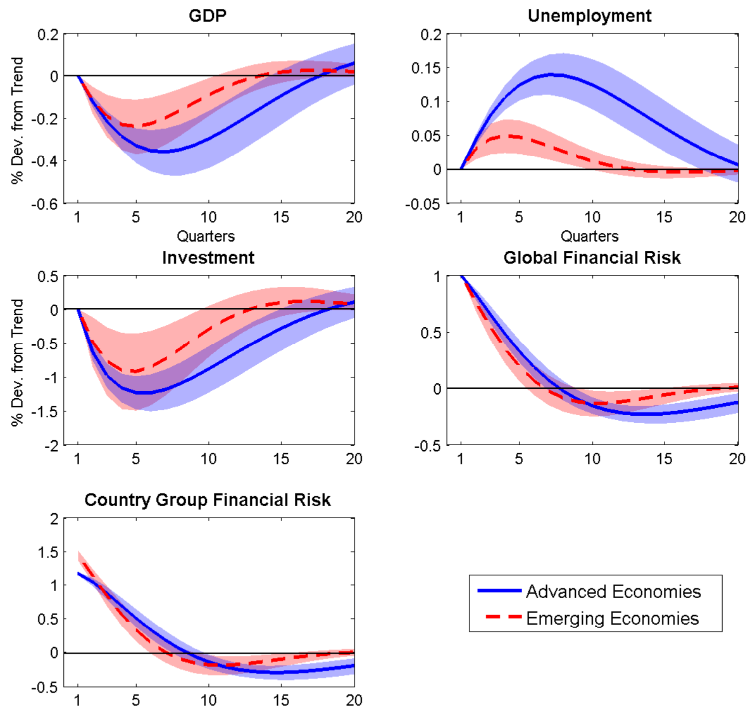
control for non-U.S.-related financial factors and more importantly for the impact of U.S. financial risk on country-group financial risk. Second, given our interest in differences between EMEs and SOAEs *and not on EMEs alone*, using country-group spreads that broadly capture financial conditions specific to these two groups is the most straightforward approach in the absence of *comparable* country-specific credit spreads *for both EMEs and SOAEs*. Indeed, most of the literature has focused on the response of EMEs to interest rate shocks using EMBI-based country interest rates (Neumeyer and Perri, 2005; Uribe and Yue, 2006; Fernández and Gulan, 2015). In fact, fully comparable interest rate spread measures for SOAEs are not available since the latter do not have EMBI measures. Thus, to maintain as much comparability as possible and estimate the same specification for both country groups, we abstract from including country interest rates (as in Uribe and Yue, 2006) in our VAR specification and instead consider the above-mentioned country-group risk measures.[10]

Identification Assumptions and Relation to Existing Work The identification assumptions we adopt follow well-known literature (see Uribe and Yue, 2006, and Akinci, 2013). Specifically, we assume that A is lower triangular with unit diagonal elements. In addition, given our focus on global financial risk shocks, our baseline specification assumes that global (U.S.) and country-group financial risk have lagged effects on real domestic variables, but domestic variables can affect country-group financial risk contemporaneously

[10]We note, though, that the median correlation between the cyclical component of our EME-country-group spread measure and the cyclical component of EMBI spreads for each of the EMEs in our sample is 0.81 (with each country correlation being statistically significant at conventional levels), suggesting that our EME country-group financial risk measure successfully captures relevant features of country-specific interest rates. See Fernández and Gulan, 2015, for the link between corporate and sovereign spreads.

(see Uribe and Yue, 2006).

Figure 1: Orthogonalized Impulse Response Functions to an Increase in Global Financial Risk (100 basis points): GDP, Investment, Unemployment, and Country-Group Financial Risk



Notes: Authors' calculations using data from Haver Analytics and FRED. The EME country sample includes: Brazil, Colombia, Mexico, Peru, The Philippines, and Thailand. The advanced-economy country sample includes: Australia, Austria, Belgium, Canada, Denmark, Finland, Israel, Netherlands, New Zealand, and Sweden. Shaded areas represent 95 percent confidence intervals computed using Monte-Carlo simulations with 10000 replications.

This procedure allows us to extract global financial risk shocks and analyze their impact on economic activity and unemployment in our two country groups. We follow related literature and order the global risk and country-group financial risk measures last, but this specific ordering does not affect our main findings. A similar comment applies to a different ordering of all variables within the domestic block. We estimate each panel SVAR with 1 lag (using additional lags does not change our main conclusions).

There are two important and non-negligible differences between our work and Uribe and Yue (2006) and Akinci (2013). Relative to these two studies: (1) we compare SOAEs to EMEs instead of only studying EMEs; and (2) we focus on global financial risk shocks as opposed to country and U.S. interest rate shocks, which is similar to Akinci 2013), but include the *unemployment rate as a key domestic variable of interest* within a context of EMEs *and* SOAEs (this variable is absent in both Uribe and Yue, 2006, and Akinci, 2013, as well as other related papers in the literature).[11]

Main Findings Figure 1 shows orthogonalized impulse response functions of real GDP, investment, unemployment, and country-group financial risk in EMEs and SOAEs to an increase in global financial risk of 100 basis points.

A temporary rise in global financial risk generates an increase in country-group risk and unemployment and a contraction in output and investment in both country groups. The overall response of output and investment is very similar in EMEs and SOAEs, though EMEs seem to exhibit marginally earlier recoveries, if at all. *Importantly for our purposes, though, the rise in unemployment is unambiguously more subdued and less persistent in EMEs.*

[11] Akinci (2013)'s measure of global financial risk is the U.S. BAA corporate spread, which is constructed as the U.S. BAA corporate borrowing rate minus the long-term U.S. Treasury bond rate. Our measure of global financial risk is very similar as it coincides very well with the U.S. BAA corporate spreads, even though our measure is based on high yield measures with BB1 category or lower. Another difference relative to Akinci (2013) beyond including unemployment is that our baseline EME sample includes more countries (Colombia, Philippines, and Thailand) in addition to the set of countries in her EME sample. Using Akinci's measure of global risk does not change any of our main findings.

We also note that EME financial risk is more responsive to the rise in global financial risk relative to SOAE financial risk. This is not only consistent with the well-known relevance of EMBI spread disturbances in the EME literature (which capture EME financial risk) but also with Akinci's (2013) findings regarding the impact of global financial risk on country (EMBI) spreads *in an EME-only context*. This result also makes the markedly more subdued response of unemployment in EMEs all the more noteworthy.

The Appendix shows that using richer specifications do not change our main findings. These specifications include: (1) adding private consumption (Figure A1); (2) adding domestic credit to the private sector (subject to data availability for EMEs, which implies a considerably smaller EME sample; Figures A2 and A3); (3) a richer specification with US real GDP and U.S. real interest rates, as well as a commodity price index to control for global demand conditions (Figures A7 and A8); and (4) an alternative specification with the VIX volatility index as a proxy of global financial risk (Figure A9) (see the Appendix for more details). A similar claim applies to the inclusion of unemployment-based EME outliers (South Africa and Turkey) in the EME sample, a longer time period for each country group (which implies excluding The Netherlands and Thailand from the SOAE and EME samples, respectively), and an analysis restricted to having only small-open European economies in the SOAE sample (see Figures A5 and A6 in the Appendix). All told, we conclude that our main results—*the most important and robust of which is the unambiguously more subdued and less persistent response of unemployment in EMEs*—hold under a battery of different specifications.

3 The Model

To shed light on the factors that may explain the differential response of unemployment (and economic activity) to global financial shocks in EMEs relative to SOAEs, we introduce banking frictions in the spirit of Gertler, Kiyotaki, and Queralto (2012) and Aoki, Benigno, and Kiyotaki (2016) into a tractable small-open-economy (SOE) RBC model with labor search. Banks use external funds—specifically, domestic deposits and foreign funds—and their own net worth to lend resources to production firms that participate in the banking system for the purchase of production capital. A standard assumption in this literature is that banks are able to divert a fraction of external funds for their own gain. As a result, they face frictions in obtaining external resources for lending.

We make the following three non-trivial model additions to explore the relevance of limited financial access by firms and households in EMEs amid global financial risk shocks. First, we introduce two categories of households: financially-included households, denoted by i, whose members have access to bank deposits and account for a measure $0 < \phi_n < 1$ of individuals in the economy; and financially-excluded households, denoted by e, whose members do not have access to bank deposits (and therefore the banking system) and who account for a measure $(1 - \phi_n)$ of individuals in the economy. Second, we define two categories of production firms. The first set of firms—in category (or sector) i (for financially-included firms)—depend on bank credit to purchase capital (and therefore participate in the banking system) and are owned by i households. The second set of firms—in category (or sector) e (for financially-excluded firms)—have no access to bank financing, are owned by e households, and rely solely on internal (household) resources. Third, both firm categories face standard labor search and matching frictions, which generate equilibrium unemployment. Following related literature, we abstract from endogenous labor force participation decisions and normalize the total labor force (and therefore the total population) to 1.

As noted in Section 2, EMEs have relatively low shares of the population receiving wages into an account at a financial institution (recall Table 1), high shares of self-employment (who operate micro firms), large shares of household-owned and -operated micro and small firms without access to the banking system, and a large share of informal (or unregistered) firms in EMEs that rarely have access to or participate in formal credit markets (see IFC, 2010a,b; GFDR, 2014). Assuming that e households are the owners and managers of firms without bank credit is therefore consistent with the employment and firm structure in EMEs suggested by the data, and does not change our main conclusions.

Given the above non-trivial modifications to a standard SOE RBC model with banking frictions, we initially assume that i (e) firms only hire workers from i (e) households in order to highlight the central features of our baseline framework with clarity. However, we stress that this assumption is inconsequential for our main results. Indeed, the Appendix presents the details of a much richer framework where unemployed members in each household category can search for jobs across firm categories (and not just within their own category) such that there is no labor market segmentation. Importantly, we show that our main findings and mechanisms remain intact in this richer environment.

Final Output A perfectly-competitive final goods firm purchases sectoral output from firms i and e to produce a final good whose price is normalized to 1. Formally, the firm maximizes $\Pi_{a,t} = [y_t - p_{i,t}y_{i,t} - p_{e,t}y_{e,t}]$ subject to the CES function y_t=$y(y_{i,t}, y_{e,t})$, where y_i and y_e denote firm i and firm e output, respectively. In turn, p_i and p_e are the relative prices of sectoral output. The solution to this problem yields standard optimal relative prices p_i and p_e that depend on sectoral output shares.

Firm i-Capital Producers A representative capital producer is owned by i households and sells capital to i firms.[12] The capital producer chooses investment $i_{i,t+1}$ to maximize $\mathbb{E}_0\sum_{t=0}^{\infty}\Xi^i_{t|0}\Pi_{k,t}$ subject to $\Pi_{k,t} = [Q_t i_{i,t} - i_{i,t} - \Phi\left(i_{i,t}/i_{i,t-1}\right) i_{i,t}]$ where the evolution of capital is $k_{i,t+1} = (1-\delta)k_{i,t} + i_{i,t}$.[13] $\Xi^i_{t|0}$ is the capital producers' discount factor (formally defined in household i's problem below), Q_t is the price for firm-i capital, and δ is the exogenous depreciation rate. $\Phi\left(i_{i,t}/i_{i,t-1}\right)$ is a standard investment adjustment cost function that satisfies $\Phi'(\cdot) > 0, \Phi''(\cdot) > 0$. The optimal price for firm-i capital is standard:

$$\mathbb{E}_t\Xi^i_{t+1|t}Q_{t+1} = \mathbb{E}_t\Xi^i_{t+1|t}\left(1 + \Phi\left(\frac{i_{i,t+1}}{i_{i,t}}\right) + \Phi'\left(\frac{i_{i,t+1}}{i_{i,t}}\right)\frac{i_{i,t+1}}{i_{i,t}}\right) - \mathbb{E}_t\Xi^i_{t+2|t}\Phi'\left(\frac{i_{i,t+2}}{i_{i,t+1}}\right)\left(\frac{i_{i,t+2}}{i_{i,t+1}}\right)^2. \tag{1}$$

Financially-Included Households A representative financially-included (i) household has a measure $0 < \phi_n < 1$ of household members. Following the labor search literature, there is perfect consumption insurance within the household. i households are the ultimate owner of banks, i-capital producers, and i firms; they hold bank deposits and receive salaried income from

[12]Following the literature on banking frictions, the inclusion of capital producers merely allows us to determine the equilibrium price of firm capital, which is relevant for banks' net worth since this price is a component of the total value of loans.

[13]We assume that capital producers choose next period's investment to be consistent with the VAR evidence, where investment does not respond contemporaneously to global financial shocks. Assuming standard timing assumptions are inconsequential for our main results.

household members employed in i firms. These households choose $c_{i,t}$ and bank deposits d_t to maximize $\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \mathbf{u}(c_{i,t})$ subject to $c_{i,t} + d_t + T_t = R_t d_{t-1} + \Pi_{a,t} + \Pi_{i,t} + \Pi_{b,t} + w_{i,t} n_{i,t} + b u_{i,t}$, where $\mathbf{u}'(c_i) > 0, \mathbf{u}''(c_i) < 0$. R is the gross real interest rate on bank deposits; Π_a, Π_i and Π_b are lump-sum profits from final-goods-firms, i firms, and banks, respectively; T denotes lump-sum taxes; w_i is the real wage in firm i (determined via Nash bargaining); b is the contemporaneous value of unemployment; $n_{i,t}$ is the measure of workers employed by i firms; and $u_{i,t} = \phi_n - n_{i,t}$ is unemployment among i households.[14] The first-order conditions yield a standard consumption-savings Euler equation: $\mathbf{u}'(c_{i,t}) = R_t \mathbb{E} \beta \mathbf{u}'(c_{i,t+1})$. Household i's stochastic discount factor is $\Xi^i_{t+1|t} \equiv \beta \mathbf{u}'(c_{i,t+1}) / \mathbf{u}'(c_{i,t})$.

Firm i Production To introduce interest rate spreads and give financial risk shocks a non-trivial role, we follow the literature on banking frictions and assume that representative firm i requires external financing from banks to purchase capital. Specifically, firm i raises external funds by selling state-contingent securities $s_{i,t}$ to banks at price Q_t. This takes place in frictionless markets (financial frictions giving rise to spreads are on the banks' side). The firm's problem is to choose vacancies $v_{i,t}$, desired firm-i employment $n_{i,t+1}$, desired capital $k_{i,t+1}$, and securities $s_{i,t}$ to maximize $\mathbb{E}_0 \sum_{t=0}^{\infty} \Xi^i_{t|0} \Pi_{i,t}$ subject to

$$\begin{aligned} \Pi_{i,t} &= p_{i,t} z_t F(n_{i,t}, k_{i,t}) - w_{i,t} n_{i,t} - \zeta(v_{i,t}) \\ &\quad - Q_t k_{i,t+1} + Q_t (1-\delta) k_{i,t} + Q_t s_{i,t} - R_{k_i,t} Q_{t-1} s_{i,t-1}, \end{aligned}$$

[14] Since there is no endogenous labor force participation, households simply take the perceived evolution of employment in i firms, $n_{i,t+1} = (1 - \rho^i) [n_{i,t} + u_{i,t} f_{i,t}]$, where $f_{i,t}$ is the (endogenous) job-finding probability and ρ^i is the (exogenous) job destruction probability in firm i, as given.

and the perceived evolution of employment $n_{i,t+1} = (1-\rho^i)\left[n_{i,t} + v_{i,t}q_{i,t}\right]$, where z is exogenous aggregate productivity, $F(n_i, k_i)$ is a constant-returns-to-scale production function that is increasing in both of its arguments, and $\zeta(v_{i,t})$ is the total cost of posting vacancies, with $\zeta'(v_{i,t}) > 0$ and $\zeta''(v_{i,t}) \geq 0$. R_{k_i} is the return on firm-i capital; ρ^i is the exogenous employment separation probability; and $q_{i,t}$ is the endogenous job-filling probability (discussed below).

The firm's first-order conditions yield a standard job creation condition

$$\frac{\zeta'(v_{i,t})}{q_{i,t}} = (1-\rho^i)\mathbb{E}_t\Xi^i_{t+1|t}\left\{p_{i,t+1}z_{t+1}F_{n_i,t+1} - w_{i,t+1} + \frac{\zeta'(v_{i,t+1})}{q_{i,t+1}}\right\}, \quad (2)$$

as well as a capital Euler equation and an optimal choice over issued securities, where the latter two can be combined to yield

$$R_{k_i,t+1} = \frac{\left[p_{i,t+1}z_{t+1}F_{k_i,t+1} + (1-\delta)Q_{t+1}\right]}{Q_t}. \quad (3)$$

Intuitively, firm i equates the expected marginal cost of posting a vacancy to the expected marginal benefit. The latter is given by the marginal product of labor net of the Nash wage, plus the continuation value of the employment relationship. In turn, the firm equates the marginal cost of issuing a security to obtain bank funds to the return on capital, where the latter is given by the marginal product of capital and the market value of a (depreciated) unit of capital, adjusted for the initial price of capital Q_t. Note that $Q_t s_{i,t} = Q_t k_{i,t+1}$ holds in equilibrium.

Banks The banking structure follows a flexible-price, perfectly-competitive version of Aoki, Benigno, and Kiyotaki (2016).[15] A key difference in our

[15] As such, we follow their exposition and notation. See Gertler, Kiyotaki, and Queralto (2012) for a closed-economy version with inside and outside bank equity, as well as Gertler

framework relative to existing models is the assumption that only a segment of households and firms in the economy, as opposed to all of them, participate in the banking system by supplying deposits and borrowing from banks. In what follows, we abstract from using subscripts to denote individual banks purely for expositional clarity.

Banks use their own net worth nw_t and external funds—deposits from i households d_t and foreign funds b_t^*—to lend to i firms via the purchase of state-contingent securities $s_{i,t}$. The total loan value is given by $Q_t s_{i,t}$. Thus, a given bank's balance sheet is $Q_t s_{i,t} = nw_t + b_t^* + d_t$, where nw depends on the gross return from i-firm securities net of the costs of obtaining foreign funds and i household deposits: $nw_t = R_{k_i,t} Q_{t-1} s_{i,t-1} - R_t^* b_{t-1}^* - R_t d_{t-1}$, where $R_t^* = R^* + \eta_b \left[\exp(b_{t-1}^* - b^*) - 1\right]$, R^* is the gross real foreign interest rate and $\eta_b \left[\exp(b_t^* - b^*) - 1\right]$ is the debt-elastic component (Schmitt-Grohé and Uribe, 2003). As in Aoki, Benigno, and Kiyotaki (2016), let x_t be the share of total bank assets that are funded using foreign funds, $x_t = b_t^* / Q_t s_{i,t}$. We can then rewrite the evolution of a bank's net worth as $nw_t = \left[(R_{k_i,t} - R_t) + x_{t-1} (R_t - R_t^*)\right] Q_{t-1} s_{t-1} + R_t nw_{t-1}$. Following the literature on banking frictions, banks can divert a fraction $\Theta(x_t)$ of assets $Q_t s_{i,t}$ for their private gain, where $\Theta(x_t) = \lambda \left[1 + (\kappa_t^*/2) \cdot x_t^2\right]$. κ_t^* has mean $\kappa^* > 0$ and follows a stochastic process. Since shocks to κ^* embody foreign financial disturbances affecting the domestic economy, with a rise in κ_t^* causing the bank's constraint to become tighter, we interpret an exogenous increase in κ_t^* as an increase in global financial risk. Given the possibility of asset diversion by banks, depositors restrict the amount of funds they supply to banks, and the latter face constraints in obtaining external funds. Thus, banks accumulate assets via retained earnings and use their net worth, deposits, and foreign

and Kiyotaki (2010).

funds to lend to i firms. A standard assumption to prevent banks from growing out of their constraints is to have banks exit the sector with exogenous i.i.d. probability $(1-\phi)$ each period, in which case i households receive the exiting banks' accumulated retained earnings. Exiting banks are immediately replaced by entering banks so that the share of banks in the economy remains constant (see Gertler, Kiyotaki, and Queralto, 2012).

Denote by V_t the bank's franchise value at the end of period t: $V_t = \mathbb{E}_t\left[\sum_{j=t+1}^{\infty}(1-\phi)\phi^{j-t-1}\Xi^l_{t|j}nw_j\right]$, where ϕ is the bank's exogenous i.i.d. probability of survival. The bank will not divert external funds if the following condition holds: $V_t \geq \Theta(x_t)Q_t s_{i,t}$, where $\Theta(x_t)Q_t s_{i,t}$ denotes the bank's payoff from diverting funds. All told, the bank's Bellman equation at the end of period $t-1$ can be expressed as:

$$V_{t-1}(s_{i,t-1}, x_{t-1}, nw_{t-1}) = \mathbb{E}_{t-1}\Xi^l_{t|t-1}\left[(1-\phi)nw_t + \phi \max_{s_{i,t},x_t} V_t(s_{i,t}, x_t, nw_t)\right]$$

subject to the incentive compatibility constraint $V_t \geq \Theta(x_t)Q_t s_{i,t}$ and the evolution of net worth $nw_t = \left[(R_{k_i,t} - R_t) + x_{t-1}\left(R_t - R^*_t\right)\right]Q_{t-1}s_{i,t-1} + R_t nw_{t-1}$. Following the literature, we conjecture that V_t is linear in each of its components. Thus, similar to standard models, we have

$$V_t(s_{i,t}, x_t, nw_t) = \left(\eta_{i,t} + x_t\eta^*_t\right)Q_t s_{i,t} + \eta_t nw_t,$$

where we can show that $\eta_t = \mathbb{E}_t\Xi^i_{t+1|t}\Omega_{t+1}R_{t+1}$, $\eta^*_t = \mathbb{E}_t\Xi^i_{t+1|t}\Omega_{t+1}\left[R_{t+1} - R^*_{t+1}\right]$, and $\eta_{i,t} = \mathbb{E}_t\Xi^i_{t+1|t}\Omega_{t+1}\left[R_{k_i,t+1} - R_{t+1}\right]$. Define the shadow value of the bank's net worth as $\Omega_{t+1} \equiv 1 - \phi + \phi\left[\eta_{t+1} + \tau_{t+1}\left(\eta_{i,t+1} + x_{t+1}\eta^*_{t+1}\right)\right]$, and let $\tau_t = Q_t s_{i,t}/nw_t$ be the bank's leverage ratio (Gertler, Kiyotaki, and Queralto, 2012). In turn, $\eta_{i,t}$ and η^*_t denote, respectively, the discounted excess return on i-firm assets over deposits and the discounted difference between the rate of return on deposits and foreign funds (a measure of the cost advantage of foreign funds over deposits). Using the above conjecture for $V_t(s_{i,t}, x_t, nw_t)$, the bank's optimal choices are embodied in the following condition:

$$x_t = -\frac{\eta_{i,t}}{\eta_t^*} + \left[\left(\frac{\eta_{i,t}}{\eta_t^*} \right)^2 + \frac{2}{\kappa_t^*} \right]^{1/2}. \tag{4}$$

This expression is identical to those in models with banking frictions and determines the optimal share of foreign funds in total external funds for lending (see Aoki, Benigno, and Kiyotaki, 2016). Note that if η^* increases relative to η_i, it is cheaper in relative terms to use foreign funds, leading to a higher x.

Finally, given that banks exit with probability ϕ, the banking sector's *aggregate* net worth evolution can be expressed as:

$$nw_t = (\phi + \xi)\left(R_{k_i,t} - R_t\right) Q_{t-1} s_{i,t-1} - \phi \left[\left(R_t - R_t^*\right) b_{t-1}^* + R_t nw_{t-1} \right], \tag{5}$$

where i households transfer an exogenous fraction $\xi/(1-\phi)$ of the exiting banks' assets to entering banks to cover the startup costs of entering banks.

Adverse global (foreign) financial risk shocks—a higher κ_t^*–tighten banks' constraints and reduce the relative cost of using deposits as opposed to foreign funds to finance loans. Both foreign funds and households' deposits contract since the amount banks can divert increases, leading to an equilibrium contraction in the demand for firm-i shares and therefore the provision of bank loans. i firms' ability to purchase capital falls, leading to reduced hiring that is reflected in lower firm employment and ultimately output.

Financially-Excluded Households and Firm e Production There is a representative financially-excluded (e) household with measure $(1 - \phi_n)$ of household members and perfect risk pooling within the household. There is also a representative e firm. Household e members can only work in e firms.[16] Households own and receive income from e firms and make all decisions over labor demand and capital accumulation for these firms. Thus, we can think of e firms as family firms and interpret e households as supplying labor to e firms other than the ones they own, and as hiring workers for their e firms from e households other than their own. e firms use labor from e households and internally accumulated capital to produce.[17] Given our assumption about households effectively making all decisions for e firms, we frame these households' employment and capital decisions from the perspective of a demander of labor. Formally, households choose consumption $c_{e,t}$, capital accumulation $k_{e,t+2}$, vacancy postings $v_{e,t}$, and desired employment $n_{e,t+1}$ to maximize $\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \mathbf{u}(c_{e,t})$ subject to[18] $c_{e,t} = \Pi_{e,t} + w_{e,t} n_{e,t} + b u_{e,t}$, e-firm profits $\Pi_{e,t} = p_{e,t} z_t F(n_{e,t}, k_{e,t}) - i_{e,t} - w_{e,t} n_{e,t} - \zeta(v_{e,t})$, the evolution of e-firm capital $k_{e,t+1} = (1-\delta) k_{e,t} + i_{e,t}$, and the perceived evolution of employment $n_{e,t+1} = (1-\rho^e)\left[n_{e,t} + v_{e,t} q_{e,t}\right]$, where $F(n_e, k_e)$ is a constant-returns-to-scale

[16] Recall that, as stated earlier, we relax this assumption and show that a richer version of our baseline model where both households can send their unemployed members to search across firm categories (presented in the Appendix) does not change our main conclusions.

[17] This is consistent with EME SMEs' reliance on internal resources in the absence of formal external financing (IFC, 2010a,b). Assuming a representative capital producer that sells capital to both i and e firms (without the need for bank loans on the part of e firms since, per the evidence in Section 2, the latter do not participate in the banking system) does not change our main results. Of note, SMEs without access to bank financing tend to be constrained. A reduced-form way of capturing this fact without introducing additional financial frictions that would make the model even more complex is to allow e firms to face larger investment adjustment costs relative to i firms. Doing so does not change our main conclusions.

[18] Once again, we assume that investment is a state variable to guarantee that the response of investment is consistent with the VAR evidence, but this assumption has no impact on our main results.

production function that is increasing in both of its arguments, i_e is firm-e investment, w_e is the real wage in firm e (determined via Nash bargaining), and $\zeta(v_{e,t})$ is the total cost of posting vacancies, with $\zeta'(v_{e,t}) > 0$ and $\zeta''(v_{e,t}) \geq 0$.[19] Of note, we abstract from explicitly including investment adjustment costs above for expositional simplicity but include them as part of our quantitative analysis to be consistent with i firms. $u_{e,t} = (1-\phi_n) - n_{e,t}$ denotes unemployment among e households, ρ^e is the exogenous firm-e employment separation probability, and $q_{e,t}$ is the corresponding endogenous job-filling probability (defined below).

The firm's first-order conditions yield standard job creation and capital Euler equations:

$$\frac{\zeta'(v_{e,t})}{q_{e,t}} = (1-\rho^e)\mathbb{E}_t\Xi^e_{t+1|t}\left\{p_{e,t+1}z_{t+1}F_{n_e,t+1} - w_{e,t+1} + \frac{\zeta'(v_{e,t+1})}{q_{e,t+1}}\right\}, \qquad (6)$$

and

$$\mathbb{E}_t\Xi^e_{t+1|t} = \mathbb{E}_t\Xi^e_{t+2|t}\left\{p_{e,t+2}z_{t+2}F_{k_e,t+2} + (1-\delta)\right\}, \qquad (7)$$

where $\Xi^e_{t+1|t} \equiv \beta\mathbf{u}'(c_{e,t+1})/\mathbf{u}'(c_{e,t})$ is the e household's stochastic discount factor. Intuitively, firm e equates the expected marginal cost of posting a vacancy to the expected marginal benefit, given by the (discounted) marginal product of labor net of the wage, plus the continuation value of employment relationships. Similarly, the firm equates the marginal cost of a unit of capital to its expected marginal benefit.

Total Unemployment, Matching Processes, Nash Bargaining, and Resource Constraint Let the matching functions $m_{j,t} = m_j(v_{j,},u_{j,t})$ for

[19] Assuming that the cost of vacancy posting is convex captures in a reduced-form the additional costs and constraints (including those that are outside the scope of this paper) that prevent firms without access to bank credit from easily expanding.

$j = e, i$ be constant-returns-to-scale (CRS). The corresponding job-finding (job-filling) probabilities are $f_{j,t} = f(\theta_{j,t}) = m_{j,t}/u_{j,t}$ ($q_{j,t} = q(\theta_{j,t}) = m_{j,t}/v_{j,t}$), while sectoral labor market tightness is $\theta_{j,t} \equiv v_{j,t}/u_{j,t}$ for $j = e, i$. Wages are determined by bilateral Nash bargaining between households and firms, so that $w_{j,t} = \chi\left[p_{j,t}z_t F_{n_j}(n_{j,t}, k_{j,t}) + \zeta'(v_{j,t})\theta_{j,t}\right] + (1-\chi)b$, for $j = e, i$, where χ is the workers' bargaining power.[20]

In turn, the government budget constraint is $T_t = b(u_{e,t} + u_{i,t})$ and the economy's resource constraint is given by[21]

$$y_t = c_{i,t} + c_{e,t} + i_{i,t} + \Phi\left(i_{i,t}/i_{i,t-1}\right) i_{i,t} + i_{e,t} + \zeta(v_{i,t}) + \zeta(v_{e,t}) + R^*_{t-1}b^*_{t-1} - b^*_t. \quad (8)$$

We note that *total* unemployment is given by $u_t = u_{e,t} + u_{i,t} = 1 - n_{e,t} - n_{i,t}$. The list of equilibrium conditions is presented in the Appendix.

4 Quantitative Analysis

Given the limited amplification present in standard models with banking frictions (including ours), our quantitative analysis is meant to shed light on the key economic factors that may explain the differential response to global financial shocks in EMEs vis-à-vis SOAEs rather than to *exactly* match the quantitative responses across country groups in Section 2.

Functional Forms and Shocks The utility function is CRRA: $\mathbf{u}(c) = c^{1-\sigma}/(1-\sigma)$, where $\sigma > 0$. The production are Cobb-Douglas: $F(n_{j,t}, k_{j,t}) = n_{j,t}^{1-\alpha_j} k_{j,t}^{\alpha_j}$ with $0 < \alpha_j < 1$. In turn, the matching functions are of the CES form:

[20] See the Appendix for more details behind the value functions used to obtain the Nash wage expressions.

[21] Once again, we introduce investment adjustment costs for e firms in our quantitative analysis.

$m(v_{j,t}, u_{j,t}) = u_{j,t}v_{j,t}/(u^{\mu}_{j,t} + v^{\mu}_{j,t})^{1/\mu}$ with $\mu > 0$ for $j = e, i$ (see Den Haan, Ramey, and Watson, 2000).[22] The investment adjustment cost function is $\Phi(i_{j,t}/i_{j,t-1}) = (\varphi_k/2)(i_{j,t}/i_{j,t-1} - 1)^2$, $\varphi_k > 0$ and the cost of vacancy posting is $\zeta(v_{j,t}) = \psi(v_{j,t})^{\phi_j}$ with $\psi > 0$ and $\phi_j > 0$ for $j = e, i$. Total output is $y_t = \left[\gamma_y y^{\phi_y}_{i,t} + (1 - \gamma_y) y^{\phi_y}_{e,t}\right]^{\frac{1}{\phi_y}}$, where $0 < \gamma_y < 1$, $\phi_y < 1$. We note γ_y is one way in which we can tractably capture the relative importance of firms that participate in the banking system in economic activity without introducing endogenous firm entry, where the latter would add unnecessary complexity to an already rich environment.[23]

We assume that κ^*_t follows an independent AR(1) process in logs: $\ln(\kappa^*_t) = (1 - \rho_{\kappa)}) \ln(\kappa^*) + \rho_\kappa \ln(\kappa^*_{t-1}) + \varepsilon^\kappa_t$, where $0 < \rho_\kappa < 1$ and $\varepsilon^\kappa_t \tilde{} N(0, \sigma_\kappa)$. Finally, aggregate productivity z is normalized to 1. Given our main focus on financial risk shocks, we assume that aggregate productivity is constant.

Parameters from Literature We calibrate our benchmark model to a representative EME. Values for standard parameters are based on existing literature on business cycles, labor search, and banking frictions. The time period is a quarter. The capital shares α_i and α_e are set to 0.32 (plausible and factual differences across firm categories, with e firms being less capital intensive, do not change our results). The household's subjective discount factor is $\beta = 0.985$ and the capital depreciation rate δ is 0.025. The workers' bargaining power χ is set to 0.50, a standard value in the literature. The share of i household members in the economy is $\phi_n = 0.45$, consistent with the EME evidence in Table 1. The exogenous separation probabilities are set to $\rho^i = \rho^e =$

[22] As noted in Den Haan, Ramey, and Watson (2000), such functional form implies that all matching probabilities are bounded between 0 and 1 always.

[23] See Epstein and Finkelstein Shapiro (2017) for work on banking reforms in a model with monopolistic banking, search frictions, and endogenous firm entry in an EME context.

0.04, in line with evidence for EMEs (Bosch and Maloney, 2008; asymmetries do not change our main conclusions). We assume that $\phi_i = \phi_s = 2$ (see Merz and Yashiv, 2007). In addition, $\phi_y = 0.8$, implying a relatively high degree of substitution between firm i and firm e output in total output (our results do not change under other reasonable values).[24] The steady-state foreign interest rate R^* is set to 1.0019 (Fernández and Gulan, 2015).

The relative risk aversion parameter σ is 2. The majority of EMEs do not have official unemployment insurance (UI) schemes, so the contemporaneous value of unemployment b is 0. We show that deviations from this assumption *for SOAEs* where official UI schemes are the norm do not change our conclusions. We set the foreign debt elasticity parameter η_b to 0.001, a smaller number consistent with the EME business cycle literature (García-Cicco, Pancrazi, and Uribe, 2010). We set $\varphi_k = 1$, consistent with commonly-used values in the literature (Gertler, Kiyotaki, and Queralto, 2012). Alternative values for these parameters do not change our main findings. Finally, given our focus on global financial risk shocks, we set $\rho_\kappa = 0.90$ and $\sigma_\kappa = 0.01$,. The persistence parameter is consistent with the empirical evolution of a global financial risk shock.

Calibrated Parameters for Benchmark (EME) Model The remaining parameters $\mu, \psi, \gamma_y, \phi, \kappa^*, \xi$, and λ are chosen to match: an unemployment rate of 6.41 percent, a total cost of posting vacancies as a share of output of roughly 2 percent (broadly consistent with the search literature; alternative plausible

[24] The relatively high substitutability between firms' output is consistent with survey evidence suggesting that more than 70 percent of registered (or formal) firms—firms that are more likely to participate in the banking system—in our EME sample report facing direct competition from unregistered firms (which are less likely to participate in the banking system) (World Bank World Development Indicators). This high degree of competition naturally implies that output across firm categories is likely to be highly substitutable *on average*.

targets have no impact on our main findings), a share of firm i output in total output of 0.63, a bank leverage of 6 and a ratio of foreign-currency bank liabilities to total bank liabilities of roughly 0.25 (IMF Financial Soundness Indicators), a ratio of bank startup funds to net worth of 2.78 percent (Global Financial Development Database), and a median quarterly lending-deposit spread of 1.16 percent (World Bank World Development Indicators). These targets are based on averages for the EME sample in our empirical analysis. As a baseline and in the absence of direct measurements on the contribution of firms that have bank credit to total output, we use the share of formal-sector output (which is more often than not comprised of firms that participate in the banking system) from Schneider (2012) as a proxy. Of course, while most economies incorporate measurements of informal sector production in their national accounts, the extent to which this is captured varies by country, especially among EMEs where the informality is more prevalent. We explore the sensitivity of our results to this target. All told, the resulting parameter values are: $\mu = 0.1350, \psi = 0.0165, \gamma_y = 0.6379, \phi = 0.8832, \kappa^* = 4.9192, \xi = 0.0387$, and $\lambda = 0.4576$. Introducing plausible asymmetries across firm categories does not change our main conclusions.

Parameters for SOAE Model To minimize any asymmetries that would otherwise cloud the driving mechanisms, we use the same values for all parameters. As a baseline and per the evidence in Section 2, the only difference between EMEs and SOAEs is in the share of i households ϕ_n, which we set to 0.977 based on Table 1. This difference alone endogenously generates a higher share of total output from firms with bank credit (see Table 3).[25]

[25]This is consistent with the fact that the average size of the informal sector in SOAEs, which we use as a proxy for output by firms that do not participate in the banking system absent other measures, is considerably lower in these economies relative to our EME sample.

4.1 Steady State

Table 3: Steady States in Benchmark (EME) Model and SOAE Model

Variable	EME	SOAE	EME, Higher γ_y
y	0.8196	0.9825	0.8407
n_i	0.4227	0.9116	0.4234
n_e	0.5132	0.0219	0.5096
u	$0.0641^{\ddagger}$	0.0665	0.0670
Agg. Consumption	0.6625	0.8073	0.6870
Agg. Investment	0.1400	0.1530	0.1361
Lending Spread	$0.0116^{\ddagger}$	0.0116	0.0116
d	1.9926	3.6693	2.6928
b^*	0.6642	1.2214	0.8963
s_i	3.1882	5.8688	4.3069
$p_i y_i / y$	$0.6300^{\ddagger}$	0.9677	$0.8700^{\ddagger}$
Average LP	0.8760	1.0530	0.9011

Notes: ‡ denotes a targeted first moment. *Average LP* denotes average labor productivity in the economy. Aggregate consumption is given by the sum of e and i households' consumption when appropriate. Aggregate investment is given by the sum of sectoral investment. All averages refer to employment-weighted averages.

Table 3 shows that, relative to SOAEs, EMEs have: lower output, consumption, and investment levels; lower levels of domestic deposits and foreign funds and incidentally lower bank credit (both in levels and as a share of total (annual) output), a smaller contribution of firms with bank credit to total output, and somewhat lower unemployment. Thus, our model endogenously generates well-known differences in economic development (proxied by total output y), banking sector importance in financing production, and domestic financial access between EMEs and SOAEs.

A relevant implication of the model is that the share of employment (as a percent of the labor force) in firms with bank credit is 0.42 in EMEs—this is an *endogenous outcome* and not a result of the calibration targets we use. The corresponding share in the SOAE model is 0.91. Intuitively, increasing ϕ_n to SOAE levels implies that a larger share of individuals in the economy supply bank deposits. In turn, this leads to higher domestic credit (a higher

s_i), which allows i firms to obtain more capital and increase hiring, inducing an *endogenous* reallocation of employment away from e firms and into i firms. As a result, n_i is now much higher. Coupled with the increase in i-firm capital, i-firm output is not only higher (which contributes to a higher total output level) but also accounts for a larger share of total output (second-to-last line in Table 3). Of note, *this reallocation of sectoral output is also endogenous*. More important is the *endogenous* reallocation of employment across firms emphasized above since a larger n_i implies that the bulk of employment is now in i firms, which are directly vulnerable to changes in global financial risk. *In principle and given how sectoral unemployment is determined, a potential outcome in the model could be that the change in ϕ_n is simply reflected in an increase in sectoral and aggregate* ***un****employment, with little change in sectoral employment. This is not the case in our model: sectoral employment does change, as confirmed in Table 3.* Finally, the model generates an *average* labor productivity in SOAEs that is higher relative to EMEs (consistent with cross-country OECD data).

While data limitations prevent us from pinning down the share of employment in firms with bank credit (labor market surveys do not ask whether individuals are employed in firms that have bank credit), indirect evidence suggests that the relative allocation of employment in the EME and SOAE models is plausible. Indeed, more than 70 percent of firms in EMEs tend to be unregistered (informal) and have hardly any access to bank credit; also, most of these firms tend to be small and medium enterprises (SMEs), which account for more than 50 percent of employment in EMEs (IFC, 2010a; Ayyagari, Demirguc-Kunt, Maksimovic, 2011; OECD, 2013). In fact, informal employment—defined as employment without a formal or legally-protected contract and without pension benefits, the bulk of which is in SMEs—represents close to

50 percent of the labor force in our EME sample but only 13 percent in our SOAE sample (OECD, 2009; European Social Survey). Therefore, taking informal employment as a rough indicator of employment in firms without bank credit, the (endogenous) allocations of employment in the benchmark (EME) model and in the SOAE model are broadly in line with the data.[26] This is important to highlight since the (endogenous) share of employment across firms determines the share of employment that is vulnerable to financial disruptions.

4.2 Response to Global Financial Risk: Data vs. Model

We compare the responses of the benchmark (EME) model and the SOAE model to a temporary and identical increase in global financial risk (an increase in κ_t^*).

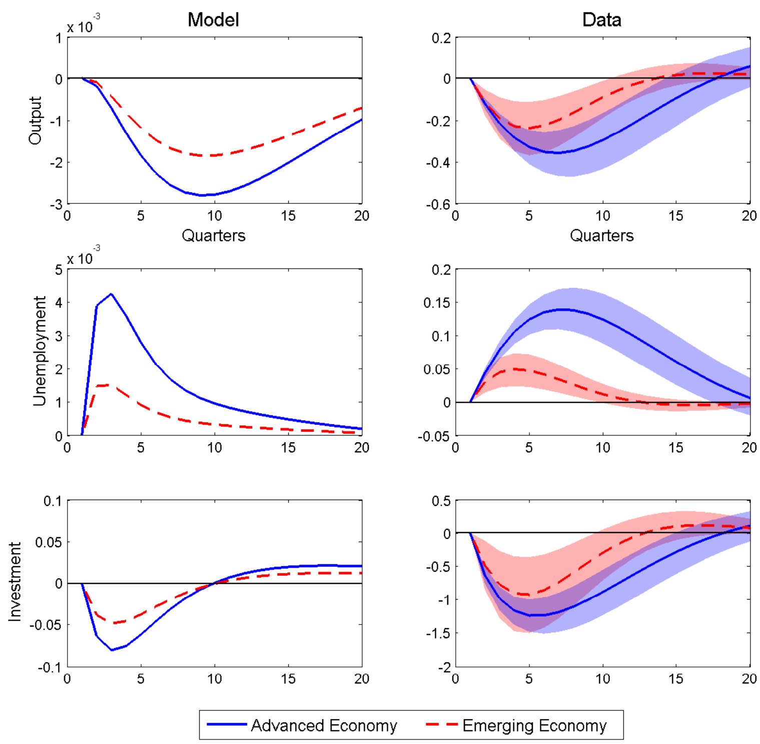
Figure 2 shows that our framework can successfully generate the broad differential response of unemployment, but also output and investment, in EMEs and SOAEs. Particularly noteworthy is the unambiguously more subdued response of unemployment in the EME model.[27] Of note, the fact that the scales of the model-generated impulse responses do not match their empirical counterparts *in absolute terms* is not a damning limitation since our main objective is to shed light on the underlying causes behind the existence of *relative differences* in the response of EMEs vis-á-vis SOAEs. Also, while the model-generated impulse responses are less hump-shaped and lack amplification, the

[26] In our sample of EMEs and SOAEs, the correlation between the share of individuals with an account at financial institutions and the size of the informal sector as a share of GDP (informal employment as measured by the share of non-agricultural self-employment) is -0.81 (-0.84) and strongly statistically significant.

[27] As shown in Figures A11 and A12 in the Appendix, recalibrating the SOAE to match SOAE-specific targets and assuming positive unemployment benefits in the SOAE model *alongside changes in the degree of financial inclusion consistent with SOAEs' levels of financial inclusion* delivers a more (empirically-factual) hump-shaped unemployment response without changing any of our conclusions.

latter is well-known in models with banking frictions and lies beyond the scope of study.

Figure 2: Response of Output and Unemployment to a Rise in Global Financial Risk: Model vs. Data



Notes on "Data" column: Based on authors' calculations using data from Haver Analytics and FRED. The EME country sample includes: Brazil, Colombia, Mexico, Peru, The Philippines, and Thailand. The advanced-economy country sample includes: Australia, Austria, Belgium, Canada, Denmark, Finland, Israel, Netherlands, New Zealand, and Sweden. Shaded areas represent 90 percent confidence intervals computed using Monte-Carlo simulations with 1000 replications.

The intuition behind the contraction in economic activity and expansion in unemployment *in both economies* is straightforward: a temporary increase in κ^* tightens banks' constraints, implying that the amount of external funds they can divert increases. This pushes households to reduce deposits. At the same time, the fall in the supply of deposits leads to an increase in the discounted difference between the rate of return on deposits and foreign funds, which pushes banks to reduce their demand for foreign funding.

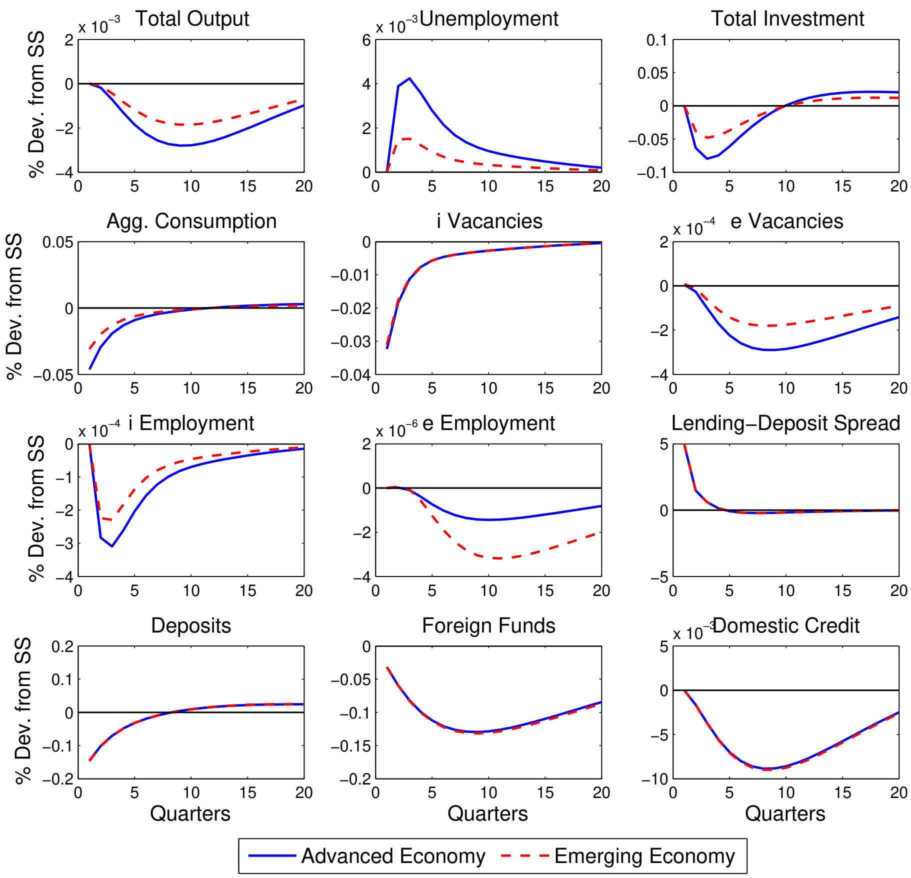
All told, banks' overall external funds contract, leading to a reduction in the availability of bank resources for i firms. The resulting fall in funding not only affects i firms' prospects of obtaining funds for capital but also leads to an increase in lending-deposit spreads that ultimately puts a dent on capital demand and hiring. As a result, i-firm investment, employment, and output fall. Given i firms' larger contribution to output and their more sensitive employment response, total output falls and unemployment rises. Of note, this occurs despite the fact that a segment of the economy is less dependent on the banking system and therefore less exposed to financial disruptions.

Household Financial Inclusion and Unemployment Dynamics As shown in Figure 2, household financial inclusion is crucial for explaining the more subdued expansion of unemployment in EMEs in the data.

In turn, the fact that an increase in household financial inclusion endogenously generates a larger share of total output coming from firms with bank credit contributes to differences in investment and output dynamics between EMEs and SOAEs.[28] To shed light on the intuition behind our dynamic results, Figure 3 compares the benchmark (EME) model (red dashed line) and the SOAE model (solid blue line) after an identical exogenous temporary increase in global financial risk in the two economies.

[28]EMEs tend to have larger average lending-deposit spreads relative to SOAEs. These would be reflected in differences in λ, but this is not a feature tied to financial inclusion and participation per se, but rather to other structural features of the banking system. We discuss the implications of differences in bank lending-deposit spreads as part of our robustness analysis.

Figure 3: Response to a Rise in Global Financial Risk: Higher Household Financial Inclusion in EMEs



Absent any other differences between EMEs and SOAEs, the response of bank-related variables (deposits, foreign funds, and domestic credit and spreads) is the same in both economies.[29] Importantly, note that while e va-

[29] Introducing steady-state productivity differentials such that i firms are more productive in SOAEs relative to EMEs implies that domestic credit and foreign funds exhibit sharper contractions in EMEs, without changing our main results. This is consistent with empirical evidence based on a richer VAR specification that includes domestic credit to the private sector (subject to data availability for EMEs; see Figures A2 and A3 in the Appendix). Differences in lending-deposit spreads between SOAEs and EMEs also generate a differential

cancies fall by less in EMEs, i vacancies exhibit similar contractions in the two economies. Furthermore, recall from Table 3 that more than 50 percent of employment is in e firms in EMEs, whereas the bulk of employment is in i firms in SOAEs. Taken together, this implies that in SOAEs, the response of i employment will be the primary driver of the response of unemployment. Thus, the sharper fall of i-firm employment in SOAEs contributes to the larger increase in total unemployment. While not shown for expositional brevity, we note that wages contract by more in the SOAE model, suggesting that the sharper response of unemployment is *not* a result of more stable wages.

Output and Investment Turning to the response of output and investment, the more subdued response in EMEs traces back to the fact that e firms contribute more to total output and investment relative to SOAEs. As a result, the smaller response of investment and output among e firms in EMEs (not shown) has greater weight in total investment and output, leading to earlier recoveries in both. Of course, this result is based on a baseline assumption of perfect measurement of output by firms without bank credit (Figure A14 in the Appendix illustrates a version of the model with imperfect measurement of output and investment showing that, as expected, the latter are closer to SOAEs under imperfect measurement in EMEs).[30]

To make our point regarding the importance of household financial inclusion for unemployment dynamics more transparent, consider a version of the baseline (EME) model where we fix the share of i households at its baseline level and instead consider the contribution to total output by firms with bank

response in bank-related variables.

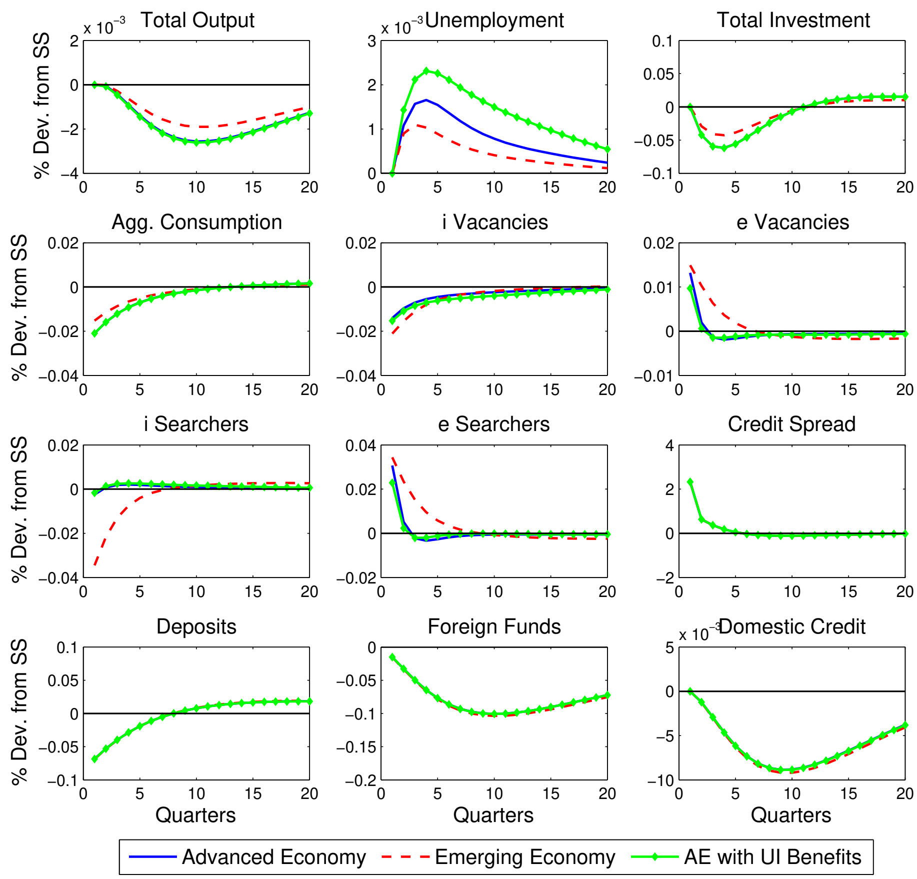
[30]Recall that per ILO guidelines, labor market surveys explicitly consider formal and informal employment, especially in EMEs. As such, unemployment is much less likely to be mismeasured in terms of not capturing those who are likely to have found employment in firms without bank credit.

credit as the only difference between EMEs and SOAEs. Specifically, we choose γ_y to match a share of output from these firms in total output of 0.87 (a target consistent with our proxy for the i-firm output share in SOAEs; see Schneider, 2012) while holding all other parameters at their baseline (EME) values. The last column of Table 3 shows the steady state for this scenario. Note that the model is once again able to generate several stylized facts on the differences between EMEs and SOAEs, mainly higher output and domestic credit levels, among others. Importantly, though, the allocation of employment across firm categories remains virtually unchanged relative to the baseline (EME) model. Figure A10 in the Appendix shows that when we increase change γ_y to generate a larger share of i-firm output in total output relative to the baseline (EME) model, the importance of i-firm output in total output, *by itself*, has no impact on unemployment dynamics. This confirms that the endogenous reallocation of employment induced by higher household financial inclusion is crucial for explaining the differences in unemployment dynamics in EMEs and SOAEs, but must be accompanied by a corresponding change in the contribution of firms with bank credit to total output in order to generate a response of output and investment in the two country groups that is more subdued and consistent with the empirical evidence in our parsimonious empirical specification.

All told, the *endogenous* allocation of employment across firms with and without bank credit, which can be traced back to the share of financially-included individuals in the economy, plays a critical role in generating non-trivial differences in unemployment dynamics in EMEs—economies where less than 50 percent of individuals have access to bank deposits—relative to SOAEs—economies where virtually all individuals participate in the banking system. More broadly, the cyclical dynamics of investment, unemployment, and output are consistent with the empirical response of EMEs and SOAEs to an increase in global financial risk. Moreover, our model-based results regarding the share of individuals with access to the banking system, the share of employment in firms with bank credit, and the share of output by these firms are broadly consistent with the empirical relationship between informal employment, informal sector size, and financial inclusion (see Section A.16 of the Appendix, Figure A15, and the accompanying discussion; as noted there, informal employment (as measured by self-employment) and informal sector size are proxies for employment and economic activity in firms that are excluded from participating in the banking system absent comparable cross-country data on employment and output in firms without bank credit).

The Irrelevance of Labor Market Segmentation for Differential Unemployment Dynamics For simplicity, our benchmark model assumes that individuals searching for employment in i (e) firms belong to i (e) households and cannot search for employment in e (i) firms (i.e., labor market segmentation). In a non-trivial modification of the model, we now allow *both* households to endogenously choose how to allocate their unemployed members to search across *both* firm categories. Incidentally, i and e firms can now hire workers from both household categories. This establishes an additional non-trivial channel beyond relative prices through which global financial risk shocks affects e firms and households. For expositional brevity, the details of this richer framework and its calibration are presented in the Appendix.

Figure 4: Response to a Rise in Global Financial Risk: Household Employment Search Across Firm Categories



Note: Whenever the blue lines are not visible, the SOAE model and the SOAE model with UI benefits are responding in exactly the same way, so that the blue and green lines are superimposed.

Figure 4 presents the results for the richer model and confirms that our baseline assumptions regarding labor search are not critical for explaining the differential response of unemployment—our most important and robust empirical finding—and that our results are not obtained by construction. As was the case in the baseline model, differential unemployment dynamics are explained by household financial inclusion, with the unemployment response in SOAEs being driven by the response of i searchers (i.e., unemployed individuals *from both households* searching for employment in i firms). We also show that having unemployment insurance (UI) benefits in SOAEs b—calibrated to represent 60 percent of average wages based on OECD evidence—further strengthens this mechanism.

Alternative Explanations and Robustness Two differences between EME and SOAEs beyond financial inclusion are the presence (absence) of UI benefits in SOAEs (EMEs), which are initially zero in both economies to minimize any unnecessary asymmetries, and differences in domestic lending-deposit spreads.

One possible explanation behind the unemployment response in SOAEs is that real wages are less volatile relative to EMEs (as in the data; see Boz, Durdu, and Li, 2015). A simple way to check that this is *not* a quantitatively-plausible explanation is to consider UI benefits in SOAEs as *the only difference* between country groups—with SOAEs (EMEs) having positive (zero) UI benefits—which makes real wages in SOAEs less volatile. As shown in Figure A13 in the Appendix, differences in UI benefits alone (holding financial inclusion at its baseline level) cannot generate considerable differences in unemployment dynamics between the two economies amid global financial risk shocks. Figure A11 in the Appendix also shows that assuming differences in unemployment benefits across country groups *alongside differences in household financial inclusion* (that is, a SOAE model with UI benefits) does not change our conclusions. Thus, neither rigid wages nor positive UI benefits alone can rationalize the differential unemployment response across country groups.

While EMEs have an average quarterly lending-deposit spread of 1.16 percent, SOAEs have an average spread of 0.811 percent. Figure A12 in the Appendix shows a version of the baseline (EME) model where we reduce λ to match the lending-deposit spread in SOAEs, holding all other parameters (including ϕ_n) at their baseline (EME) values.[31] The Appendix shows that lending-deposit spreads by themselves play a minor role in explaining the differential response of unemployment between country groups.

Finally, our work focuses on global financial shocks and not on unconditional business cycle dynamics. We note that the benchmark (EME) model is able to generate factual business cycle dynamics in EMEs—a relative consumption volatility greater than 1, and countercyclical trade balance and unemployment—when aggregate productivity shocks and country premia shocks that are negatively correlated with productivity (see, for example, Neumeyer and Perri, 2005) are incorporated into the model. In turn, the SOAE model generates a relative consumption volatility lower than 1, an acyclical or procyclical trade balance, and countercyclical unemployment when country premia shocks are factually smaller.

5 Conclusion

Emerging economies (EMEs) exhibit considerably lower levels of domestic household and firm financial participation relative small open advanced economies (SOAEs). We provide novel VAR-based evidence suggesting that after an increase in global financial risk, the response of unemployment is markedly more subdued in EMEs relative to SOAEs. In contrast, the differential response of

[31] Of note, in this recalibrated version of the model, λ is lower relative to our baseline EME. This implies that a smaller fraction of resources are diverted by banks and is, in a reduced-form way, consistent with SOAEs having more developed banking systems and stronger institutions relative to EMEs.

GDP and investment across the two country groups is noticeably smaller. We build a small open economy model with labor search, banking frictions, and household and firm heterogeneity in participation in the banking system to shed light on this fact. In the model, adverse global financial shocks disrupt banks' ability to raise external funds, reducing the availability of resources for firms that rely on bank credit, thereby leading to a contraction in aggregate employment, investment, and output. We show that the share of financially-included individuals in the economy is critical for explaining the differences in unemployment dynamics across country groups. Thus, limited access to bank credit by firms is not sufficient for explaining the differential response of unemployment in the two country groups: the degree of household financial inclusion is important as well. Our findings may have implications for the effectiveness of cyclical policies responding to financial shocks in economies with limited domestic financial participation among firms *and* households.

References

[1] Akinci, Ozge. 2013. "Global Financial Conditions, Country Spreads and Macroeconomic Fluctuations in Emerging Economies," *Journal of International Economics*, Vol. 91, Issue 2, pp. 358-371.

[2] Akinci, Ozge, and Albert Queralto. 2014. "Banks, Capital Flows, and Financial Crises," *Federal Reserve Board of Governors International Finance Discussion Paper 1121.*

[3] Alessandria, George, Joseph P. Kaboski, and Virgiliu Midrigan. 2013. "Trade Wedges, Inventories, and International Business Cycles," *Journal of Monetary Economics*, Vol. 60(1), pp. 1-20.

[4] Aoki, Kosuke, Gianluca Benigno, and Nobuhiro Kiyotaki. 2016. "Monetary and Financial Policies in Emerging Markets," *mimeo.*

[5] Ayyagari, Meghana, Thorsten Beck, and Asli Demirgüç-Kunt. 2007. "Small and Medium Enterprises across the Globe," *Small Business Economics*, Vol. 29, pp. 415–434.

[6] Ayyagari, Meghana, Asli Demirgüç-Kunt, and Vojislav Maksimovic. 2011. "Small vs. Young Firms Across the World : Contribution to Employment, Job Creation, and Growth," Policy Research Working Paper 5631, The World Bank: Washington, D.C.

[7] Ayyagari, Meghana, Asli Demirgüç-Kunt, Asli, and Vojislav Maksimovic. 2012. "Financing of Firms in Developing Countries: Lessons from Research," Policy Research Working Paper 6036, The World Bank: Washington, D.C.

[8] Beck, Thorsten and Asli Demirgüç-Kunt. 2006. "Small and Medium-Size Enterprises: Access to Finance as a Growth Constraint," *Journal of Banking & Finance*, 30, pp. 2931-2943.

[9] Beck, Thorsten, Asli Demirgüç-Kunt, and María Soledad Martínez Pería. 2007. "Reaching Out: Access to and Use of Banking Services Across Countries," *Journal of Financial Economics*, Vol. 85, pp. 234–266.

[10] Beck, Thorsten, Asli Demirgüç-Kunt, and Vojislav Maksimovic. 2008. "Financing Patterns around the World: Are Small Firms Different?" *Journal of Financial Economics*, Vol. 89(3), pp. 467–487.

[11] Bosch, Mariano and William Maloney. 2008. "Cyclical Movements in Unemployment and Informality in Developing Countries," *IZA Discussion Paper No. 3514*.

[12] Boz, Emine, Ceyhun Bora Durdu, and Nan Li. 2015. "Emerging Market Business Cycles: The Role of Labor Market Frictions," *Journal of Money Credit and Banking*, Vol. 47(1), pp. 31-72.

[13] Buera, Fransisco J., Roberto N. Fattal Jaef, and Yongseok Shin. 2015. "Anatomy of a Credit Crunch: From Capital to Labor Markets," *Review of Economic Dynamics*, 18(1), pp. 101-117.

[14] Cuadra, Gabriel, and Victoria Nuguer. 2015. "Risky Banks and Macroprudential Policy for Emerging Economies," *mimeo.*

[15] Dabla-Norris, Eta, and Junko Koeda. 2008. "Informality and Bank Credit: Evidence from Firm-Level Data," *IMF Working Paper WP/08/94.*

[16] Dedola, Luca, Peter Karadi, and Giovanni Lombardo. 2013. "Global Implications of National Unconventioanl Policies," *Journal of Monetary Economics*, Vol. 60, pp. 66-85.

[17] Den Haan, Wouter J., Garey Ramey, and Joel Watson. 2000. "Job Destruction and the Propagation of Shocks," *American Economic Review*, Vol. 90(3), pp. 482-498.

[18] European Central Bank. 2015. "Survey on the Access to Finance of Enterprises in the Euro Area (SAFE)," ISSN 1831-9998 (online).

[19] Epstein, Brendan, and Alan Finkelstein Shapiro. 2017. "Banking and Financial Participation Reforms, Labor Markets, and Financial Shocks," *mimeo.*

[20] Epstein, Brendan, and Alan Finkelstein Shapiro. 2017. "Financial Development, Employment Heterogeneity, and Sectoral Dynamics," *mimeo.*

[21] Epstein, Brendan, Alan Finkelstein Shapiro, and Andrés González Gómez. 2017. "Financial Disruptions and the Cyclical Upgrading of Labor," *Review of Economic Dynamics,* Vol. 26, pp. 204-224.

[22] Fernández, Andrés, and Felipe Meza. 2015. "Informal Employment and Business Cycles in Emerging Economies: The Case of Mexico," *Review of Economic Dynamics*, Vol. 18, pp. 381-405.

[23] Fernández, Andrés, and Adam Gulan. 2015. "Interest Rates and Business Cycles in Emerging Economies: The Role of Financial Frictions," *American Economic Journal: Macroeconomics*, Vol. 7(3), pp. 153-188.

[24] Fink, Fabian, and Yves S. Schüler. 2015. "The Transmission of US Systemic Financial Stress: Evidence for Emerging Market Economies," *Journal of International Money and Finance*, Vol. 55, pp. 6-26.

[25] Finkelstein Shapiro, Alan, and Andrés González Gómez. 2017. "Credit Market Imperfections, Labor Markets, and Leverage Dynamics in Emerging Economies," *mimeo.*

[26] García-Cicco, Javier, Roberto Pancrazi, and Martin Uribe. 2010. "Real Business Cycles in Emerging Countries?" *American Economic Review*, Vol. 100(5), pp. 2510-2531.

[27] Gertler, Mark, and Peter Karadi. 2011. "A Model of Unconventional Monetary Policy," *Journal of Monetary Economics*, Vol. 58, pp. 17-34.

[28] Gertler, Mark, and Nobuhiro Kiyotaki. 2010. "Financial Intermediation and Credit Policy in Business Cycle Analysis," Chapter 11, Handbook of Monetary Economics, Vol. 3, pp. 547-599. Edited by Benjamin M. Friedman and Michael Woodford.

[29] Gertler, Mark, Nobuhiro Kiyotaki, and Albert Queralto. 2012. "Financial Crises, Bank Risk Exposure and Government Financial Policy," *Journal of Monetary Economics*, Vol. 59, pp. 517-534.

[30] Gilchrist, Simon, and Benoit Mojon. 2017. "Credit Risk in the Euro Area," *Economic Journal* (forthcoming).

[31] Gilchrist, Simon, and Egon Zakrajšek. 2012. "Credit Spreads and Business Cycle Fluctuations," *American Economic Review*, 102(4), pp. 1692-1720.

[32] GFDR. 2014. "Financial Inclusion," Global Financial Development Report 2014, The World Bank Group: Washington D.C.

[33] Große Steffen, Christoph. 2015. "Business Cycles and Financial Intermediation in Emerging Economies," *mimeo.*

[34] IFC. 2010a. "Scaling-Up SME Access to Financial Services in the Developing World," Financial Inclusion Experts Group, SME Finance Sub-Group, International Finance Corporation.

[35] IFC. 2010b. "The SME Banking Knowledge Guide," International Finance Corporation: Washington D.C.

[36] Jermann, Urban, and Vincenzo Quadrini. 2012. "Macroeconomic Effects of Financial Shocks," *American Economic Review*, 102(1), pp. 238-271.

[37] Kose, M. Ayhan, Christopher Otrok, and Eswar Prasad. 2012. "Global Business Cycles: Convergence or Decoupling?" *International Economic Review*, Vol. 53(2), pp. 511-538.

[38] Mendoza, Enrique G. 2010. "Sudden Stops, Financial Crises, and Leverage," *American Economic Review*, 100, pp. 1941-1966.

[39] Merz, Monika, and Eran Yashiv. 2007. "Labor and the Market Value of the Firm," *American Economic Review*, Vol. 97(4), pp. 1419-1431.

[40] Monacelli, Tomasso, Vincenzo Quadrini, and Antonella Trigari. 2012. "Financial Markets and Unemployment," *Marshall Research Paper Series Working Paper FBE 01.13*, University of Southern California Marshall School of Business.

[41] Neumeyer, Pablo A., and Fabrizio Perri. 2005. "Business Cycles in Emerging Economies: The Role of Interest Rates," *Journal of Monetary Economics*, 52(2), pp. 345–380.

[42] Nuguer, Victoria. 2015. "Financial Intermediation in a Global Environment," *Banco de México Working Paper No. 2015-05.*

[43] OECD. 2009. "Overview: Data on Informal Employment and Self-Employment," in *Is Informal Normal? Towards More and Better Jobs in Developing Countries*, OECD Development Centre, Ed. Johannes P. Jütting and Juan R. de Laiglesia.

[44] OECD. 2012. "Measuring Entrepreneurial Finance: A European Survey of SMEs," Entrepreneurship at a Glance 2012. http://dx.doi.org/10.1787/entrepreneur_aag-2012-en.

[45] OECD. 2013. "Firm Size," in *OECD Science, Technology and Industry Scoreboard 2013: Innovation for Growth,* OECD Publishing. dx.doi.org/10.1787/sti_scoreboard-2013-62-en.

[46] OECD. 2016. "Financing SMEs and Entrepreneurs 2016: An OECD Scoreboard," OECD Publishing, Paris. http://dx.doi.org/10.1787/fin_sme_ent-2016-en.

[47] Schneider, Friedrich. 2012. "The Shadow Economy and Work in the Shadow: What Do We (Not) Know?" *IZA Discussion Paper Series No. 6423.*

[48] Schmitt-Grohé, Stephanie, and Martín Uribe. 2003. "Closing Small Open Economy Models," *Journal ot International Economics*, Vol. 61(1), pp. 163-185.

[49] Uribe, Martin, and Vivian Z. Yue. 2006. "Country Spreads and Emerging Countries: Who Drives Whom?" *Journal of International Economics*, Vol. 69, pp. 6-36.

[50] World Economic Forum. 2008. "The Financial Development Report 2008," World Economic Forum: Geneva, Switzerland. ISBN-13: 978-92-95044-08-1.